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SHORT COMMUNICATION

RELATIONSHIP OF LEAF AREA AND CHLOROPHYLL CONTENT WITH YIELD OF AROMATIC RICE

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Genetic variability for leaf area, chlorophyll content, leaf aroma and grain yield/plant of fifteen aromatic rice genotypes was studied. Chlorophyll content was not related with leaf aroma. Although leaf area failed to establish any significant contribution to grain yield in the study, but positive and significant correlation of chlorophyll content with yield confirmed its role towards sink development.

Key words : Aromatic rice, chlorophyll, grain yield, leaf area.

Leaf surface area per plant is an important determinant in production of photosynthates (Watson 1947). Photosynthetic productivity depends on leaf area, chlorophyll content and gas exchange. Correlation between leaf area and yield (Alluwar and Deotale 1991) suggests its importance in determining yield. Detection of aroma in any plant part at any growth stage (Mohanty *et al.* 1991) including leaf (Bansal *et al.* 1999) reveals differences among aromatic landraces. Keeping these in view, a study on genotypic variation in leaf area, leaf chlorophyll content and grain yield was taken up to establish relationships among them in aromatic rice genotypes.

Fifteen aromatic rice genotypes in a randomized block design with three replications were transplanted under lowland terai agro-climatic condition at N.B. Campus Farm of Bidhan Chandra Krishi Viswavidyalaya, West Bengal during wet season of 1999. A 9m² plot for each treatment with 20 x 15 cm spacing was adopted. Standard agronomic practices were followed. Chlorophyll content (a, b and total) was determined following Arnon (1949) and aroma of leaf tested following Singh *et al.* (1986). Leaf area per plant was determined for each cultivars at mid-flowering stage. Grain yield per plant was recorded at maturity.

Analysis of variance indicated significant inter-genotypic differences for leaf area, chlorophyll a, chlorophyll b, total chlorophyll and grain yield (Table 1). The mean leaf area ranged from 460.7 cm² (PK 1505-9-2-13-1) to 1052.2 cm² (Ambemohar 159). Generally, higher leaf area in land races than in the cultivated varieties indicated higher vegetative growth in former. Chlorophyll a, chlorophyll b and total chlorophyll content ranged from 0.87 - 2.44, 0.26 - 0.89 and 1.21 - 3.33 mg/g leaf fresh weight, respectively. Similar genotypic variations for chlorophyll content was reported by Bansal *et al.* (1999). Chlorophyll content was independent of aroma. Aroma testing from leaf samples of 15 genotypes revealed that 7 possessed strong and 8 mild aroma. Grain yield/plant varied from 2.19 g in Domsiah to 8.14 g in Seetabhog.

Table 2 showed positive correlation of chlorophyll content and leaf area with grain yield of aromatic rice. However, an interesting character association was revealed when the correlation between the leaf area and grain yield vis-a-vis chlorophyll content and grain yield were compared. The role of chlorophyll in photosynthesis towards governing the grain yield of aromatic rice genotypes has been observed from highly significant association between the two and this has compensated the less contribution of the leaf area in sink development as indicated by the insignificant correlation between leaf area and grain yield.

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Table 1. Leaf area, chlorophyll content aroma at mid-flowering stage and grain yield of different rice genotypes.

Genotypes	Leaf area (cm^2 $plant^{-1}$)	Chlorophyll a (mg g^{-1} fw)	Chlorophyll b (mg g^{-1} fw)	Total chlorophyll (mg g^{-1} fw)	Grain yield (g $plant^{-1}$)	Leaf Aroma[b]
Haryana Basmati	698.9	1.60	0.64	2.23	5.38	2
Karnal Local	468.9	1.16	0.79	1.95	6.71	1
PK 1505-9-2-13-1	460.7	0.96	0.37	1.33	5.40	2
Madhuri	650.2	1.41	0.67	2.09	4.64	2
Hansraj	686.0	0.98	0.38	1.36	6.74	1
Basmati Rajasthan	503.4	0.98	0.35	1.33	5.26	1
Binam	528.3	0.87	0.34	1.21	2.30	1
Domsiah	533.0	1.05	0.44	1.49	2.19	2
Basmati 370	815.4	1.29	0.40	1.68	4.49	2
Radhunipagal	904.8	2.09	0.87	2.96	6.54	1
Ambemohar 159	1052.2	2.29	0.88	3.17	6.50	2
Seetabhog	848.6	2.44	0.89	3.33	8.14	1
Tulshibhog	905.2	1.31	0.47	1.78	4.60	1
Kataribhog	981.8	0.95	0.34	1.30	4.95	1
Tulsimanjari	1020.7	0.96	0.26	1.22	5.20	2
CD at 5%	144.2	0.05	0.02	0.06	0.77	
CV %	11.70	2.39	2.47	2.00	8.52	

b = Rating scale, where 0 = no aroma, 1 = mild aroma and 2 = strong aroma.

Table 2. Correlation between leaf area, total chlorophyll and grain yield.

Components	'r' value
Leaf area/plant vs total chlorophyll content	0.381
Leaf area/plant vs grain yield/plant	0.282
Total chlorophyll content vs grain yield/plant	0.594*

*Significant at 5% level.

Based on above results, it could be concluded that among the genotypes tested, Seetabhog, Ambemohar 159 and Radhunipagal recorded higher grain yield with high chlorophyll content and moderately high leaf area per plant.

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